

# TRANSLATION OF JPS-165979

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## CLAIMS

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### [Claim(s)]

[Claim 1] A storage means by which the key-code-conversion table for changing into a common pseudo code the keycode used from two or more basic input/output system and said two or more models of each for each models is memorized according to an individual in each model, A load means to read the basic input/output system and key-code-conversion table which are used with self-equipment from said storage means when started, and to load them to memory, The keyboard basic input/output system contained in the basic input/output system loaded to memory by this load means is performed. A key input processing means to input the keycode corresponding to an input key from the key input section, and to change the input keycode into the pseudo code which corresponds with reference to said loaded key-code-conversion table, The computer characterized by performing the basic input/output system for a communication link contained in said loaded basic input/output system, and having the code transmitting means which carries out the external output of the pseudo code changed by said key input processing means from a communication link port.

[Claim 2] A storage means by which the pseudo code translation table which changes two or more basic input/output system and each predetermined pseudo code for each models into the corresponding keycode used from said each model is memorized, The load means which reads the basic input/output system and pseudo code translation table which are used with self-equipment from said storage means, and carries out the memory load of them when started, The basic input/output system for a communication link contained in the basic input/output system loaded to memory by this load means is performed. A code receiving means to receive the pseudo code transmitted to a communication link port, The keyboard basic input/output system contained in said basic input/output system is performed. The handy terminal characterized by having a code-conversion means to change the pseudo code received by said code receiving means into the keycode which corresponds with reference to said pseudo code translation table.

[Claim 3] The communication link port of a computer according to claim 1 and the communication link port of a handy terminal according to claim 2 are connected with a predetermined telecommunication cable. In said computer side After changing the predetermined keycode inputted from the key input section into the pseudo code which corresponds with said key input processing means, The pseudo code is transmitted to said handy terminal through said communication link table with said code transmitting means. In said handy terminal side After said code receiving means' receiving the pseudo code transmitted, and changing the pseudo code into the keycode which corresponds with said code-conversion means continuously, the keycode is processed as an input keycode, The key input method from the computer by which it is characterized to a handy terminal.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the key input method which can perform the key input to the handy terminal of many models from the computer of many models using one common program especially about the key input method from computers, such as a personal computer, to a handy terminal.

[0002]

[Description of the Prior Art] The importance of an activity of a handy terminal is increasing as a terminal supporting the intelligence operation of the end in SIS (strategic information system) used as today's management technical problem.

[0003] since importance is attached to portability and, as for this handy terminal, the light weight and the miniaturization are measured — the key input section — small — not becoming — the number of the keys which do not obtain, therefore are arranged is also restrained.

[0004] Therefore, when developing the application software stored in a handy terminal, as are shown in drawing 8, and a personal computer (it is hereafter called a personal computer for short) 30 is connected with a handy terminal 20 with the RS-232C cable 10 and a key input is performed from the keyboard by the side of a personal computer 30, the increase in efficiency of development is in drawing.

[0005]

[Problem(s) to be Solved by the Invention] By the way, although it is necessary to perform Keyboard BIOS (Basic Input-OutputSystem) and RS-232CBIOS in the case of a key input, the thing from the above-mentioned personal computer 30 side to a handy terminal 20 from which such BIOS is different with a model is used. Moreover, the keycode system also changes with models.

[0006] For this reason, conventionally, as shown in drawing 9, the personal computer and the handy terminal needed to start the program only for [ each ] models. Therefore, when the handy terminal of many models was developed, while creating the program only for [ each ] models, the program only for [ each ] models needed to be created also in the personal computer used as a key input, and it had become the big cause in which these factors cause delay-ization of development of a handy terminal.

[0007] As for this problem, the configuration and keycode system of a basic input/output system originate in a personal computer and a handy terminal changing with each models. Then, while a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation Change into the common pseudo code which furthermore does not depend for the key input code corresponding to an input key on a model by the computer side, and it transmits to a handy terminal. If the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side and it is made to perform key input processing corresponding to the key input code It is thought that the key input to the handy terminal of many models from the computer of many models can be performed now using one respectively common program by the computer and handy terminal side.

[0008] While a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation, the technical problem of this invention In a computer side, change the key input code corresponding to an input key into a pseudo code, and transmit to a handy terminal and the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side. It is enabling it to perform key input processing corresponding to the key input code.

[0009]

[Means for Solving the Problem] The means of this invention is as follows. First, the means of the 1st invention according to claim 1 is as follows. The storage means 1 (it is the same refer to [ of drawing 1 ] the functional block diagram and the following) has memorized the key-code-conversion table for changing into a common pseudo code the keycode used from two or more basic input/output system and said two or more models of each for each models according to an individual in each model. This storage means 1 consisted of external storage, such as ROM (lead-on memory) or a floppy disk, and a hard disk, etc., for example, has memorized the basic input/output systems (BIOS etc.) and key-code-conversion table for every model as a file according to individual. When the load means 2 is started, it reads the basic input/output system and key-code-conversion table which are used with self-equipment from the storage means 1, and loads them to memory, such as main memory. The key input processing means 3 performs the keyboard basic input/output system contained in the basic input/output system loaded to memory by the load means 2, and inputs the keycode corresponding to an input key from the key input section, and the input keycode is changed into a corresponding pseudo code with reference to the loaded key-code-conversion table. The code transmitting means 4 performs the basic input/output system for a communication link contained in the loaded basic input/output system, and carries out the external output of the pseudo code changed by the key input processing means 3 from a communication link port. The above-mentioned load means 2, the key input means 3, and the code transmitting means 4 can be packed into the program of one. Next, the means of the 2nd invention according to claim 2 is as follows. The storage means 6 (it is the same refer to [ of drawing 1 ] the functional block diagram and the following) memorizes the pseudo code translation table which changes two or more basic input/output system and each predetermined pseudo code for each models into the corresponding keycode used from said each model. This storage means 6 consisted of the IC card (IC memory card) etc., and has memorized the basic input/output system and pseudo code translation table of each model to the file according to individual. When the load means 7 is started, it reads the basic input/output system and pseudo code translation table which are used with self-equipment from the storage means 6, and loads them to memory, such as main memory. The code receiving means 8 performs the basic input/output system for a communication link contained in the basic input/output system loaded to memory by the load means 7, and receives the pseudo code transmitted to a communication link port. The code-conversion means 9 performs the keyboard basic input/output system contained in said basic input/output system, and changes the pseudo code received by the code receiving means 8 into the code which corresponds with reference to said pseudo code translation table, for example, stores it in a key data buffer (key buffer) etc. The above-mentioned load means 7, the code receiving means 8, and the code-conversion means 9 can be collected into the program of one. Moreover, the means of the 3rd invention according to claim 3 is as follows. As shown in the functional block diagram of drawing 1 , the communication link port of the computer of invention of the above 1st (For example, an RS-232C port) and the communication link port of the handy terminal of invention of the above 2nd It connects with a predetermined telecommunication cable (for example, RS-232C cable). (For example, RS-232C port) In said computer side After changing the predetermined keycode inputted from the key input section into the pseudo code which corresponds with the key input processing means 3, The pseudo code is transmitted to said handy terminal through said communication link table with the code transmitting means 4. In said handy terminal side The code receiving means 8 receives the pseudo code transmitted, then after changing the pseudo code into the keycode which corresponds with the code-conversion means 9, the keycode is

processed as an input keycode.

[0010]

[Function] The operation of the means of the 1st invention is as follows. First, in an initialization process, the load means 2 is started, and the load means 2 chooses the key-code-conversion table for changing into a predetermined pseudo code the keycode used with the basic input/output system and self-equipment which can be performed with self-equipment from the storage means 1, and loads it to memory. And whenever a key input is henceforth performed from the key input section, it changes to the pseudo code which corresponds with reference to the key-code-conversion table by which the key input processing means 3 performed the keyboard basic input/output system in the basic input/output system by which the memory load was carried out [above-mentioned] by function call (function request), and read the keycode corresponding to the above-mentioned input key, then the memory load was carried out [above-mentioned] in the keycode. Next, the code dispatch means 4 is started, and the code dispatch means 4 performs the basic input/output system for a communication link in the above-mentioned basic input/output system by function call (function request), and carries out the external output of the above-mentioned pseudo code from a communication link port. Thus, in an initialization process, the basic input/output system which can be performed with self-equipment in the memory of each computer is loaded to memory. For this reason, it is possible to describe the statement of the function call of the above-mentioned keyboard basic input/output system within the program executed in case each computer performs the above-mentioned processing in the same statement in all computers. Therefore, the computer of many models can execute one common program, and can transmit the common pseudo code independent of the model corresponding to the input key to the handy terminal of many models for every key input. The operation of the means of the 2nd invention is as follows. First, in an initialization process, the load means 7 is started, and the load means 7 chooses the pseudo code translation table changed into the basic input/output system which can be performed with self-equipment, and the keycode which uses a pseudo code with self-equipment from the storage means 6, and loads it to memory. And whenever a pseudo code is henceforth transmitted to a communication link port, the code receiving means 8 performs the basic input/output system for a communication link in the basic input/output system by which the memory load was carried out [above-mentioned] by function call (function request), and receives the pseudo code. Then, the code-conversion means 9 performs the keyboard basic input/output system in the above-mentioned basic input/output system by function call (function request), and with reference to the pseudo code translation table by which the memory load was carried out [above-mentioned], the pseudo code by which reception was carried out [above-mentioned] is changed into the corresponding keycode used with self-equipment, for example, it stores it in one field of memory, such as a predetermined key data buffer (key buffer). And reading appearance of the keycode stored in this key data buffer is carried out as a keycode corresponding to an input key by the predetermined key input processing means. Thus, in an initialization process, the basic input/output system which can be performed with self-equipment in the memory of each computer is loaded to memory. For this reason, it is possible to describe the statement of the function call of the basic input/output system for a communication link within the program performed in case each handy terminal performs the above-mentioned processing, and the above-mentioned keyboard basic input/output system in the same statement in all handy terminals. Therefore, the handy terminal of many models can execute one common program, can receive the common pseudo code transmitted for every key input from the computer of many models, then, can change the pseudo code into an usable key input code with self-equipment, and can perform predetermined key input processing. The operation of the means of the 3rd invention is as follows. First, the communication link ports (for example, RS-232C port etc.) of a computer and the communication link ports (for example, RS-232C port etc.) of a handy terminal are connected with predetermined telecommunication cables (for example, RS-232C cable etc.). Next, by the computer and handy terminal side, a predetermined program is started and an initialization process is performed. The key-code-conversion table for changing into the common pseudo code independent of a model the keycode used by this

initialization process in the basic input/output system and the interior as for which reading appearance was carried out to the memory (for example, main memory) of a computer by the load means 2 from the storage means 6 as mentioned above, and which can be performed is loaded. On the other hand, the pseudo code translation table for changing into an usable keycode the pseudo code which receives from the basic input/output system which can be performed and the above-mentioned computer by which reading appearance was carried out from the storage means 6 inside with the load means 7 is loaded to the memory (for example, main memory) of a handy terminal. And if a key input is henceforth performed from a keyboard, a computer will be changed into the pseudo code which corresponds the keycode corresponding to the input key with the key input processing means 3, then will transmit the pseudo code to the communication link port of a handy terminal through the above-mentioned communication link table with the code transmitting means 4. A handy terminal receives the pseudo code transmitted to the above-mentioned communication link port with the code receiving means 8, then changes the pseudo code into the corresponding keycode used with self-equipment with the code-conversion means 9. And it considers that the keycode is the keycode into which it was inputted by the key input with self-equipment, and predetermined key input processing is performed. Therefore, while a computer and a handy terminal can load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation, at a computer side, the key input code corresponding to an input key is changed into a pseudo code, and it transmits to a handy terminal handy terminal, and by the handy terminal side, the pseudo code which receives can be changed into the corresponding key input code used with self-equipment, and key input processing corresponding to the key input code can be performed.

[0011]

[Example] Hereafter, one example is explained with reference to drawing 2 thru/or drawing 7. Drawing 2 is drawing explaining the key input method from a personal computer to a handy terminal.

[0012] In this drawing, each of personal computers 40-1, 40-2, and 40-3 is different models, and BIOS and the keycode system which can be performed differ from each other. Moreover, it is the model from which a handy terminal 50-1, 50-2, and 50-3 differed mutually, and BIOS which can be performed differs from the keycode system.

[0013] To the above-mentioned personal computer 40-1, 40-2, and 40-3 Drawing 3 (a) Each personal computer 40-i as boiled and shown - parameter file 140-i for personal computers which consists of pseudo code translation table 142-i for  $i = 1$ , and (2, 3) to change the code used by BIOS subroutine 141 which can be performed -  $i$ , and each personal computer 40-i ( $2 \leq i \leq 3$ ) into the pseudo code in which predetermined is common  $i = 1$ , and (2, 3) are prepared and these parameter files 140-1, 140-2, 140-3 for personal computers are stored in external storage, such as a magnetic disk.

[0014] Also to moreover, the above-mentioned handy terminal 50-j ( $2 \leq j \leq 3$ ) Drawing 3 (b) Each handy terminal 50-j as boiled and shown Key-code-conversion table 152-j for changing BIOS subroutine 151-j ( $2 \leq j \leq 3$ ) which can perform  $j = 1$ , and (2, 3), and the above-mentioned pseudo code into the code used by each handy terminal 50-j ( $2 \leq j \leq 3$ ) - parameter file 150-j for handy terminals ( $2 \leq j \leq 3$ ) which changes is prepared. ( $2 \leq j \leq 3$ ) from — These - parameter files 150-1, 150-2, 150-3 for handy terminals are stored in external storage, such as an IC card (IC memory card).

[0015] Moreover, the personal computer program 240 is a program performed in case the key input to each above-mentioned handy terminal 50-i ( $2 \leq i \leq 3$ ) from the keyboard of each above-mentioned personal computer 40-i ( $2 \leq i \leq 3$ ) is performed, and can be performed in common by all the personal computers 40-1, 40-2, and 40-3.

[0016] On the other hand, the handy terminal program 250 is a program performed in case it receives through a RS-232 port, and can perform in common the pseudo code corresponding to the keycode inputted by the key input of the keyboard of each personal computer 40-1 which each personal computer 40-i ( $2 \leq i \leq 3$ ) transmits through the RS-232C cable 160, 40-2, and 40-3 by all the handy terminals 50-1, 50-2, and 50-3.

[0017] Next, the key input actuation to handy terminal 50-j (2 j= 1, 3) from personal computer 40-i (2 i= 1, 3) in the system of the above-mentioned configuration is explained, referring to the flow chart of drawing 7 in drawing 4 , drawing 5 , and the drawing 6 list.

[0018] First, programs 240 and 250 are started, respectively by personal computer 40-i (2 i= 1, 3) and handy terminal 50-j (2 j= 1, 3). By this starting, personal computer 40-i (2 i= 1, 3) reads parameter file 140-i for personal computers (2 i= 1, 3) which corresponds from external storage, and it is drawing 4 (a) on main memory about it. It loads with the shown layout (memory map) (SA1, SA2 of the flow chart of drawing 6 ). On the other hand, handy terminal 50-j (2 j= 1, 3) reads parameter file 150-j for handy terminals (2 j= 1, 3) which corresponds from an IC card etc., and is drawing 4 (b) on main memory about it. It loads with the shown layout (memory map) (SB1, SB2 of the flow chart of drawing 7 ).

[0019] Then, the key input data flow at the time of performing the key input to handy terminal 50-j (2 j= 1, 3) from the keyboard 42 of personal computer 40-i (2 i= 1, 3) is explained, referring to drawing 5 .

[0020] If alter operation of the key of the arbitration of the keyboard 42 of personal computer 40-i (2 i= 1, 3) is carried out, personal computer 40-i (2 i= 1, 3) performs the keyboard BIOS loaded on main memory by the function call described by the personal computer program 240, and stores the keycode for personal computer 40-i corresponding to the input key in the key buffer 43 prepared on main memory. Then, personal computer 40-i (2 i= 1, 3) performs the personal computer program 240, and changes the above-mentioned keycode into a pseudo code for the above-mentioned keycode from the key buffer 43 with reference to ejection (SA3) and pseudo code translation table 140-i (2 i= 1, 3) (SA4).

[0021] Next, personal computer 40-i (2 i= 1, 3) performs RS-232CBIOS loaded on main memory by the function call described by the personal computer program 240, and transmits the above-mentioned pseudo code to handy terminal 50-j (2 j= 1, 3) through the RS-232C cable 160 from an RS-232C port (SA5).

[0022] The above-mentioned processings SA3-SA5 are performed by personal computer 40-i (2 i= 1, 3) whenever key input actuation is performed by the keyboard 42 of personal computer 40-i (2 i= 1, 3), and the pseudo code corresponding to the input key is transmitted to the RS-232C port of handy terminal 50-j (2 j= 1, 3) through the RS-232C cable 160.

[0023] By the above-mentioned actuation, if it keys by the keyboard 42 of personal computer 40-i (2 i= 1, 3), the pseudo code corresponding to the input key will be transmitted to handy terminal 50-j (2 j= 1, 3) from personal computer 40-i (2 i= 1, 3). Therefore, the keyboard 42 of personal computer 40-i (2 i= 1, 3) is operated, and it becomes possible to transmit various commands and data to each handy terminal 50-j (2 j= 1, 3).

[0024] Then, actuation of handy terminal 50-j (2 j= 1, 3) which processes the pseudo code corresponding to the key by which alter operation was carried out by the keyboard 42 of personal computer 40-i (2 i= 1, 3) transmitted through the RS-232C cable 160 from personal computer 40-i (2 i= 1, 3) as mentioned above is explained, referring to the flow chart of drawing 5 and drawing 7 .

[0025] Handy terminal 50-j (2 j= 1, 3) performs RS-232CBIOS loaded to main memory by the function call described by the handy terminal program 250, receives the pseudo code which personal computer 40-i (2 i= 1, 3) transmitted from the RS-232C port (SB4), and stores it in the receive buffer in which the pseudo code was prepared on main memory (SB3).

[0026] Next, handy terminal 50-j (2 j= 1, 3) By the function call described by the handy terminal program 250 The pseudo code which performs the keyboard BIOS loaded on main memory, and is stored in the above-mentioned receive buffer It changes into the keycode for handy terminal 50-j (2 j= 1, 3) with reference to key-code-conversion table 152-j for handy terminals (2 j= 1, 3) (SB4), and stores in the key buffer 53 in which the keycode was prepared on main memory (SB5).

[0027] Handy terminal 50-j (2 j= 1, 3) performs the above-mentioned processings SB3-SB5, whenever it is transmitted to a pseudo code from a personal computer 40 side, and it carries out sequential storing of the keycode for handy terminal 50-j (2 j= 1, 3) corresponding to those pseudo codes at a key buffer 53. And handy terminal 50-j (2 j= 1, 3) considers that the keycode

stored in this key buffer 53 is a keycode corresponding to the input key of self-equipment, and performs predetermined key input processing.

[0028] A series of actuation mentioned above Even if it does not use the key input section of handy terminal 50-j (2 j= 1, 3), the keyboard 42 of computer 40-i (2 i= 1, 3) is operated, and it becomes possible various data and to carry out various command key inputs at handy terminal 50-j (2 j= 1, 3). For this reason, it becomes possible to perform a key input from the keyboard 42 of personal computer 40-i (2 i= 1, 3), and to, carry out debugging of the application software mounted in handy terminal 50-j (2 j= 1, 3) etc. to a detail by the easy key stroke for example.

[0029] Thus, BIOS which can be performed with those equipments to each personal computer 40-1, 40-2, 40-3 and each handy terminal 50-1, 50-2, and 50-3 is loaded to main memory at the time of the personal computer program 240 which each handy terminal 50-1 from which each personal computer 40-1 with which models differ, 40-2, 40-3, and a model differ, 50-2, and 50-3 perform, and starting of a handy terminal 250. Therefore, each personal computer 40-1, 40-2, 40-3 and each handy terminal 50-1, 50-2, and 50-3 can communalize the statement of a BIOS function call (BIOS subroutine call) of the key input and RS-232C data transfer which are described to the personal computer program 240 and the handy terminal program 250 which are performed, respectively. Moreover, pseudo code translation table 142-i for changing into a common pseudo code the keycode which each personal computer 40-i (2 i= 1, 3) from which a model differs at the time of the personal computer program 240 and starting of a handy terminal 250 is using uniquely, and the statement of the routine which performs conversion to a pseudo code from the keycode described by the personal computer program 240 since it is loaded to main memory can be communalized.

[0030] Therefore, all of each personal computer 40-1 with which models differ, 40-2, and 40-3 can transmit the pseudo code corresponding to the input key to handy terminal 50-j (2 j= 1, 3), whenever key input actuation is performed by the keyboard of self-equipment to each handy terminal 50-1 from which a model differs by performing the same personal computer program 240, 50-2, and 50-3.

[0031] Also in each handy terminal 50-j (1 j= 2) from which a model differs on the other hand At the time of starting of the handy terminal program 250 Since code conversion table 152-j for handy terminals for changing a pseudo code common to the above into the keycode which each handy terminal 50-j is using uniquely with BIOS which can perform self-equipment (2 j= 1, 3) is loaded to main memory The data input from an RS-232C port described to the handy terminal program 250, Each statement of a BIOS function call (BIOS subroutine call) of a key input in a list, And the statement of the routine for changing the above-mentioned pseudo code into the keycode which each handy terminal 50-1, 50-2, and 50-3 are using uniquely can be communalized.

[0032] Each handy terminal 50-1 from which a model differs, 50-2, and 50-3 [ therefore, ] By performing the same handy terminal program 250 The pseudo code corresponding to the key by which alter operation was carried out by the keyboard 42 of personal computer 40-i (2 i= 1, 3) to the personal computer 40-i (2 i= 1, 3) of the model of arbitration connected by the RS-232C cable 160 is received. Next, the pseudo code is changed into an usable keycode with self-equipment, and it becomes possible to perform key input processing corresponding to the keycode.

[0033] Moreover, as shown in drawing 4 , the personal computer program 240 and the handy terminal program 250 were considered as the common response at personal computer 40-i (2 i= 1, 3) of each model, and handy terminal 50-j (2 j= 1, 3) of each model, respectively, and considered only parameter file 140-i and 150-j (a BIOS function running routine, key-code-conversion table) as the individual response for every model. Therefore, since what is necessary is to newly create only a parameter file when using the personal computer or handy terminal of a new model, debugging of the program mounted in the handy terminal of a new model, for example can also be coped with promptly, and the development effectiveness of the program improves.

[0034]

[Effect of the Invention] While a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup

initiation, this invention In a computer side, change the key input code corresponding to an input key into a pseudo code, and transmit to a handy terminal and the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side. Since it was made to perform key input processing corresponding to the key input code, the key input to the handy terminal of many models from the computer of many models can be performed using one respectively common program by the computer and handy terminal side.

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**TECHNICAL FIELD**

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[Industrial Application] This invention relates to the key input method which can perform the key input to the handy terminal of many models from the computer of many models using one common program especially about the key input method from computers, such as a personal computer, to a handy terminal.

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**PRIOR ART**

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[Description of the Prior Art] The importance of an activity of a handy terminal is increasing as a terminal supporting the intelligence operation of the end in SIS (strategic information system) used as today's management technical problem.

[0003] since importance is attached to portability and, as for this handy terminal, the light weight and the miniaturization are measured — the key input section — small — not becoming — the number of the keys which do not obtain, therefore are arranged is also restrained.

[0004] Therefore, when developing the application software stored in a handy terminal, as are shown in drawing 8 , and a personal computer (it is hereafter called a personal computer for short) 30 is connected with a handy terminal 20 with the RS-232C cable 10 and a key input is performed from the keyboard by the side of a personal computer 30, the increase in efficiency of development is in drawing.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] While a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation, this invention In a computer side, change the key input code corresponding to an input key into a pseudo code, and transmit to a handy terminal and the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side. Since it was made to perform key input processing corresponding to the key input code, the key input to the handy terminal of many models from the computer of many models can be performed using one respectively common program by the computer and handy terminal side.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] By the way, although it is necessary to perform Keyboard BIOS (Basic Input-OutputSystem) and RS-232CBIOS in the case of a key input, the thing from the above-mentioned personal computer 30 side to a handy terminal 20 from which such BIOS is different with a model is used. Moreover, the keycode system also changes with models.

[0006] For this reason, conventionally, as shown in drawing 9 , the personal computer and the handy terminal needed to start the program only for [ each ] models. Therefore, when the handy terminal of many models was developed, while creating the program only for [ each ] models, the program only for [ each ] models needed to be created also in the personal computer used as a key input, and it had become the big cause in which these factors cause delay-ization of development of a handy terminal.

[0007] As for this problem, the configuration and keycode system of a basic input/output system originate in a personal computer and a handy terminal changing with each models. Then, while a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation Change into the common pseudo code which furthermore does not depend for the key input code corresponding to an input key on a model by the computer side, and it transmits to a handy terminal. If the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side and it is made to perform key input processing corresponding to the key input code It is thought that the key input to the handy terminal of many models from the computer of many models can be performed now using one respectively common program by the computer and handy terminal side.

[0008] While a computer and a handy terminal enable it to load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation, the technical problem of this invention In a computer side, change the key input code corresponding to an input key into a pseudo code, and transmit to a handy terminal and the pseudo code which receives is changed into the corresponding key input code used with self-equipment in a handy terminal side. It is enabling it to perform key input processing corresponding to the key input code.

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[Translation done.]

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**MEANS**

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[Means for Solving the Problem] The means of this invention is as follows. First, the means of the 1st invention according to claim 1 is as follows. The storage means 1 (it is the same refer to [ of drawing 1 ] the functional block diagram and the following) has memorized the key-code-conversion table for changing into a common pseudo code the keycode used from two or more basic input/output system and said two or more models of each for each models according to an individual in each model. This storage means 1 consisted of external storage, such as ROM (lead-on memory) or a floppy disk, and a hard disk, etc., for example, has memorized the basic input/output systems (BIOS etc.) and key-code-conversion table for every model as a file according to individual. When the load means 2 is started, it reads the basic input/output system and key-code-conversion table which are used with self-equipment from the storage means 1, and loads them to memory, such as main memory. The key input processing means 3 performs the keyboard basic input/output system contained in the basic input/output system loaded to memory by the load means 2, and inputs the keycode corresponding to an input key from the key input section, and the input keycode is changed into a corresponding pseudo code with reference to the loaded key-code-conversion table. The code transmitting means 4 performs the basic input/output system for a communication link contained in the loaded basic input/output system, and carries out the external output of the pseudo code changed by the key input processing means 3 from a communication link port. The above-mentioned load means 2, the key input means 3, and the code transmitting means 4 can be packed into the program of one. Next, the means of the 2nd invention according to claim 2 is as follows. The storage means 6 (it is the same refer to [ of drawing 1 ] the functional block diagram and the following) memorizes the pseudo code translation table which changes two or more basic input/output system and each predetermined pseudo code for each models into the corresponding keycode used from said each model. This storage means 6 consisted of the IC card (IC memory card) etc., and has memorized the basic input/output system and pseudo code translation table of each model to the file according to individual. When the load means 7 is started, it reads the basic input/output system and pseudo code translation table which are used with self-equipment from the storage means 6, and loads them to memory, such as main memory. The code receiving means 8 performs the basic input/output system for a communication link contained in the basic input/output system loaded to memory by the load means 7, and receives the pseudo code transmitted to a communication link port. The code-conversion means 9 performs the keyboard basic input/output system contained in said basic input/output system, and changes the pseudo code received by the code receiving means 8 into the code which corresponds with reference to said pseudo code translation table, for example, stores it in a key data buffer (key buffer) etc. The above-mentioned load means 7, the code receiving means 8, and the code-conversion means 9 can be collected into the program of one. Moreover, the means of the 3rd invention according to claim 3 is as follows. As shown in the functional block diagram of drawing 1, the communication link port of the computer of invention of the above 1st (For example, an RS-232C port) and the communication link port of the handy terminal of invention of the above 2nd It connects with a predetermined telecommunication cable (for example, RS-232C cable). (For example, RS-232C port) In said computer side After changing the predetermined keycode

inputted from the key input section into the pseudo code which corresponds with the key input processing means 3, The pseudo code is transmitted to said handy terminal through said communication link table with the code transmitting means 4. In said handy terminal side The code receiving means 8 receives the pseudo code transmitted, then after changing the pseudo code into the keycode which corresponds with the code-conversion means 9, the keycode is processed as an input keycode.

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## OPERATION

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[Function] The operation of the means of the 1st invention is as follows. First, in an initialization process, the load means 2 is started, and the load means 2 chooses the key-code-conversion table for changing into a predetermined pseudo code the keycode used with the basic input/output system and self-equipment which can be performed with self-equipment from the storage means 1, and loads it to memory. And whenever a key input is henceforth performed from the key input section, it changes to the pseudo code which corresponds with reference to the key-code-conversion table by which the key input processing means 3 performed the keyboard basic input/output system in the basic input/output system by which the memory load was carried out [ above-mentioned ] by function call (function request), and read the keycode corresponding to the above-mentioned input key, then the memory load was carried out [ above-mentioned ] in the keycode. Next, the code dispatch means 4 is started, and the code dispatch means 4 performs the basic input/output system for a communication link in the above-mentioned basic input/output system by function call (function request), and carries out the external output of the above-mentioned pseudo code from a communication link port. Thus, in an initialization process, the basic input/output system which can be performed with self-equipment in the memory of each computer is loaded to memory. For this reason, it is possible to describe the statement of the function call of the above-mentioned keyboard basic input/output system within the program executed in case each computer performs the above-mentioned processing in the same statement in all computers. Therefore, the computer of many models can execute one common program, and can transmit the common pseudo code independent of the model corresponding to the input key to the handy terminal of many models for every key input. The operation of the means of the 2nd invention is as follows. First, in an initialization process, the load means 7 is started, and the load means 7 chooses the pseudo code translation table changed into the basic input/output system which can be performed with self-equipment, and the keycode which uses a pseudo code with self-equipment from the storage means 6, and loads it to memory. And whenever a pseudo code is henceforth transmitted to a communication link port, the code receiving means 8 performs the basic input/output system for a communication link in the basic input/output system by which the memory load was carried out [ above-mentioned ] by function call (function request), and receives the pseudo code. Then, the code-conversion means 9 performs the keyboard basic input/output system in the above-mentioned basic input/output system by function call (function request), and with reference to the pseudo code translation table by which the memory load was carried out [ above-mentioned ], the pseudo code by which reception was carried out [ above-mentioned ] is changed into the corresponding keycode used with self-equipment, for example, it stores it in one field of memory, such as a predetermined key data buffer (key buffer). And reading appearance of the keycode stored in this key data buffer is carried out as a keycode corresponding to an input key by the predetermined key input processing means. Thus, in an initialization process, the basic input/output system which can be performed with self-equipment in the memory of each computer is loaded to memory. For this reason, it is possible to describe the statement of the function call of the basic input/output system for a communication link within the program performed in case each handy terminal performs the above-mentioned

processing, and the above-mentioned keyboard basic input/output system in the same statement in all handy terminals. Therefore, the handy terminal of many models can execute one common program, can receive the common pseudo code transmitted for every key input from the computer of many models, then, can change the pseudo code into an usable key input code with self-equipment, and can perform predetermined key input processing. The operation of the means of the 3rd invention is as follows. First, the communication link ports (for example, RS-232C port etc.) of a computer and the communication link ports (for example, RS-232C port etc.) of a handy terminal are connected with predetermined telecommunication cables (for example, RS-232C cable etc.). Next, by the computer and handy terminal side, a predetermined program is started and an initialization process is performed. The key-code-conversion table for changing into the common pseudo code independent of a model the keycode used by this initialization process in the basic input/output system and the interior as for which reading appearance was carried out to the memory (for example, main memory) of a computer by the load means 2 from the storage means 6 as mentioned above, and which can be performed is loaded. On the other hand, the pseudo code translation table for changing into an usable keycode the pseudo code which receives from the basic input/output system which can be performed and the above-mentioned computer by which reading appearance was carried out from the storage means 6 inside with the load means 7 is loaded to the memory (for example, main memory) of a handy terminal. And if a key input is henceforth performed from a keyboard, a computer will be changed into the pseudo code which corresponds the keycode corresponding to the input key with the key input processing means 3, then will transmit the pseudo code to the communication link port of a handy terminal through the above-mentioned communication link table with the code transmitting means 4. A handy terminal receives the pseudo code transmitted to the above-mentioned communication link port with the code receiving means 8, then changes the pseudo code into the corresponding keycode used with self-equipment with the code-conversion means 9. And it considers that the keycode is the keycode into which it was inputted by the key input with self-equipment, and predetermined key input processing is performed. Therefore, while a computer and a handy terminal can load automatically to memory the basic input/output system used with self-equipment at the time of program startup initiation, at a computer side, the key input code corresponding to an input key is changed into a pseudo code, and it transmits to a handy terminal handy terminal, and by the handy terminal side, the pseudo code which receives can be changed into the corresponding key input code used with self-equipment, and key input processing corresponding to the key input code can be performed.

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## EXAMPLE

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[Example] Hereafter, one example is explained with reference to drawing 2 thru/or drawing 7 . Drawing 2 is drawing explaining the key input method from a personal computer to a handy terminal.

[0012] In this drawing, each of personal computers 40-1, 40-2, and 40-3 is different models, and BIOS and the keycode system which can be performed differ from each other. Moreover, it is the model from which a handy terminal 50-1, 50-2, and 50-3 differed mutually, and BIOS which can be performed differs from the keycode system.

[0013] To the above-mentioned personal computer 40-1, 40-2, and 40-3 Drawing 3 (a) Each personal computer 40-i as boiled and shown - parameter file 140-i for personal computers which consists of pseudo code translation table 142-i for i= 1, and (2, 3) to change the code used by BIOS subroutine 141 which can be performed - i, and each personal computer 40-i (2 i= 1, 3) into the pseudo code in which predetermined is common i= 1, and (2, 3) are prepared and these parameter files 140-1,140-2,140-3 for personal computers are stored in external storage, such as a magnetic disk.

[0014] Also to moreover, the above-mentioned handy terminal 50-j (2 j= 1, 3) Drawing 3 (b) Each handy terminal 50-j as boiled and shown Key-code-conversion table 152-j for changing BIOS subroutine 151-j (2 j= 1, 3) which can perform j= 1, and (2, 3), and the above-mentioned pseudo code into the code used by each handy terminal 50-j (2 j= 1, 3) - parameter file 150-j for handy terminals (2 j= 1, 3) which changes is prepared. (2 j= 1, 3) from — These - parameter files 150-1,150-2,150-3 for handy terminals are stored in external storage, such as an IC card (IC memory card).

[0015] Moreover, the personal computer program 240 is a program performed in case the key input to each above-mentioned handy terminal 50-i (2 i= 1, 3) from the keyboard of each above-mentioned personal computer 40-i (2 i= 1, 3) is performed, and can be performed in common by all the personal computers 40-1, 40-2, and 40-3.

[0016] On the other hand, the handy terminal program 250 is a program performed in case it receives through a RS-232 port, and can perform in common the pseudo code corresponding to the keycode inputted by the key input of the keyboard of each personal computer 40-1 which each personal computer 40-i (2 i= 1, 3) transmits through the RS-232C cable 160, 40-2, and 40-3 by all the handy terminals 50-1, 50-2, and 50-3.

[0017] Next, the key input actuation to handy terminal 50-j (2 j= 1, 3) from personal computer 40-i (2 i= 1, 3) in the system of the above-mentioned configuration is explained, referring to the flow chart of drawing 7 in drawing 4 , drawing 5 , and the drawing 6 list.

[0018] First, programs 240 and 250 are started, respectively by personal computer 40-i (2 i= 1, 3) and handy terminal 50-j (2 j= 1, 3). By this starting, personal computer 40-i (2 i= 1, 3) reads parameter file 140-i for personal computers (2 i= 1, 3) which corresponds from external storage, and it is drawing 4 (a) on main memory about it. It loads with the shown layout (memory map) (SA1, SA2 of the flow chart of drawing 6 ). On the other hand, handy terminal 50-j (2 j= 1, 3) reads parameter file 150-j for handy terminals (2 j= 1, 3) which corresponds from an IC card etc., and is drawing 4 (b) on main memory about it. It loads with the shown layout (memory map) (SB1, SB2 of the flow chart of drawing 7 ).

[0019] Then, the key input data flow at the time of performing the key input to handy terminal 50-j (2 j= 1, 3) from the keyboard 42 of personal computer 40-i (2 i= 1, 3) is explained, referring to drawing 5.

[0020] If alter operation of the key of the arbitration of the keyboard 42 of personal computer 40-i (2 i= 1, 3) is carried out, personal computer 40-i (2 i= 1, 3) performs the keyboard BIOS loaded on main memory by the function call described by the personal computer program 240, and stores the keycode for personal computer 40-i corresponding to the input key in the key buffer 43 prepared on main memory. Then, personal computer 40-i (2 i= 1, 3) performs the personal computer program 240, and changes the above-mentioned keycode into a pseudo code for the above-mentioned keycode from the key buffer 43 with reference to ejection (SA3) and pseudo code translation table 140-i (2 i= 1, 3) (SA4).

[0021] Next, personal computer 40-i (2 i= 1, 3) performs RS-232CBIOS loaded on main memory by the function call described by the personal computer program 240, and transmits the above-mentioned pseudo code to handy terminal 50-j (2 j= 1, 3) through the RS-232C cable 160 from an RS-232C port (SA5).

[0022] The above-mentioned processings SA3-SA5 are performed by personal computer 40-i (2 i= 1, 3) whenever key input actuation is performed by the keyboard 42 of personal computer 40-i (2 i= 1, 3), and the pseudo code corresponding to the input key is transmitted to the RS-232C port of handy terminal 50-j (2 j= 1, 3) through the RS-232C cable 160.

[0023] By the above-mentioned actuation, if it keys by the keyboard 42 of personal computer 40-i (2 i= 1, 3), the pseudo code corresponding to the input key will be transmitted to handy terminal 50-j (2 j= 1, 3) from personal computer 40-i (2 i= 1, 3). Therefore, the keyboard 42 of personal computer 40-i (2 i= 1, 3) is operated, and it becomes possible to transmit various commands and data to each handy terminal 50-j (2 j= 1, 3).

[0024] Then, actuation of handy terminal 50-j (2 j= 1, 3) which processes the pseudo code corresponding to the key by which alter operation was carried out by the keyboard 42 of personal computer 40-i (2 i= 1, 3) transmitted through the RS-232C cable 160 from personal computer 40-i (2 i= 1, 3) as mentioned above is explained, referring to the flow chart of drawing 5 and drawing 7.

[0025] Handy terminal 50-j (2 j= 1, 3) performs RS-232CBIOS loaded to main memory by the function call described by the handy terminal program 250, receives the pseudo code which personal computer 40-i (2 i= 1, 3) transmitted from the RS-232C port (SB4), and stores it in the receive buffer in which the pseudo code was prepared on main memory (SB3).

[0026] Next, handy terminal 50-j (2 j= 1, 3) By the function call described by the handy terminal program 250 The pseudo code which performs the keyboard BIOS loaded on main memory, and is stored in the above-mentioned receive buffer It changes into the keycode for handy terminal 50-j (2 j= 1, 3) with reference to key-code-conversion table 152-j for handy terminals (2 j= 1, 3) (SB4), and stores in the key buffer 53 in which the keycode was prepared on main memory (SB5).

[0027] Handy terminal 50-j (2 j= 1, 3) performs the above-mentioned processings SB3-SB5, whenever it is transmitted to a pseudo code from a personal computer 40 side, and it carries out sequential storing of the keycode for handy terminal 50-j (2 j= 1, 3) corresponding to those pseudo codes at a key buffer 53. And handy terminal 50-j (2 j= 1, 3) considers that the keycode stored in this key buffer 53 is a keycode corresponding to the input key of self-equipment, and performs predetermined key input processing.

[0028] A series of actuation mentioned above Even if it does not use the key input section of handy terminal 50-j (2 j= 1, 3), the keyboard 42 of computer 40-i (2 i= 1, 3) is operated, and it becomes possible various data and to carry out various command key inputs at handy terminal 50-j (2 j= 1, 3). For this reason, it becomes possible to perform a key input from the keyboard 42 of personal computer 40-i (2 i= 1, 3), and to, carry out debugging of the application software mounted in handy terminal 50-j (2 j= 1, 3) etc. to a detail by the easy key stroke for example.

[0029] Thus, BIOS which can be performed with those equipments to each personal computer 40-1, 40-2, 40-3 and each handy terminal 50-1, 50-2, and 50-3 is loaded to main memory at the time of the personal computer program 240 which each handy terminal 50-1 from which each

personal computer 40-1 with which models differ, 40-2, 40-3, and a model differ, 50-2, and 50-3 perform, and starting of a handy terminal 250. Therefore, each personal computer 40-1, 40-2, 40-3 and each handy terminal 50-1, 50-2, and 50-3 can communalize the statement of a BIOS function call (BIOS subroutine call) of the key input and RS-232C data transfer which are described to the personal computer program 240 and the handy terminal program 250 which are performed, respectively. Moreover, pseudo code translation table 142-i for changing into a common pseudo code the keycode which each personal computer 40-i ( $2 \leq i \leq 3$ ) from which a model differs at the time of the personal computer program 240 and starting of a handy terminal 250 is using uniquely, and the statement of the routine which performs conversion to a pseudo code from the keycode described by the personal computer program 240 since it is loaded to main memory can be communalized.

[0030] Therefore, all of each personal computer 40-1 with which models differ, 40-2, and 40-3 can transmit the pseudo code corresponding to the input key to handy terminal 50-j ( $2 \leq j \leq 3$ ), whenever key input actuation is performed by the keyboard of self-equipment to each handy terminal 50-1 from which a model differs by performing the same personal computer program 240, 50-2, and 50-3.

[0031] Also in each handy terminal 50-j ( $1 \leq j \leq 2$ ) from which a model differs on the other hand At the time of starting of the handy terminal program 250 Since code conversion table 152-j for handy terminals for changing a pseudo code common to the above into the keycode which each handy terminal 50-j is using uniquely with BIOS which can perform self-equipment ( $2 \leq j \leq 3$ ) is loaded to main memory The data input from an RS-232C port described to the handy terminal program 250, Each statement of a BIOS function call (BIOS subroutine call) of a key input in a list, And the statement of the routine for changing the above-mentioned pseudo code into the keycode which each handy terminal 50-1, 50-2, and 50-3 are using uniquely can be communalized.

[0032] Each handy terminal 50-1 from which a model differs, 50-2, and 50-3 [ therefore, ] By performing the same handy terminal program 250 The pseudo code corresponding to the key by which alter operation was carried out by the keyboard 42 of personal computer 40-i ( $2 \leq i \leq 3$ ) to the personal computer 40-i ( $2 \leq i \leq 3$ ) of the model of arbitration connected by the RS-232C cable 160 is received. Next, the pseudo code is changed into an usable keycode with self-equipment, and it becomes possible to perform key input processing corresponding to the keycode.

[0033] Moreover, as shown in drawing 4 , the personal computer program 240 and the handy terminal program 250 were considered as the common response at personal computer 40-i ( $2 \leq i \leq 3$ ) of each model, and handy terminal 50-j ( $2 \leq j \leq 3$ ) of each model, respectively, and considered only parameter file 140-i and 150-j (a BIOS function running routine, key-code-conversion table) as the individual response for every model. Therefore, since what is necessary is to newly create only a parameter file when using the personal computer or handy terminal of a new model, debugging of the program mounted in the handy terminal of a new model, for example can also be coped with promptly, and the development effectiveness of the program improves.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the functional block diagram of this invention.

[Drawing 2] It is drawing explaining the key input method from the personal computer of one example to a handy terminal.

[Drawing 3] It is drawing showing the configuration of the parameter file used for the personal computer list of each model by the handy terminal.

[Drawing 4] It is drawing showing a personal computer when the program concerned is started, and the memory map of the main memory of a handy terminal.

[Drawing 5] It is drawing explaining the outline of actuation of this example.

[Drawing 6] It is a flow chart explaining the processing performed by the personal computer side.

[Drawing 7] It is a flow chart explaining the processing performed by the handy terminal side.

[Drawing 8] It is drawing showing the system configuration when keying from a personal computer to a handy terminal.

[Drawing 9] It is drawing explaining the key input method from the personal computer of the conventional many models to the handy terminal of many models.

[Description of Notations]

1 Six Storage means

2 Seven Load means

3 Key Input Processing Means

4 Code Transmitting Means

8 Code Receiving Means

9 Code-Conversion Means

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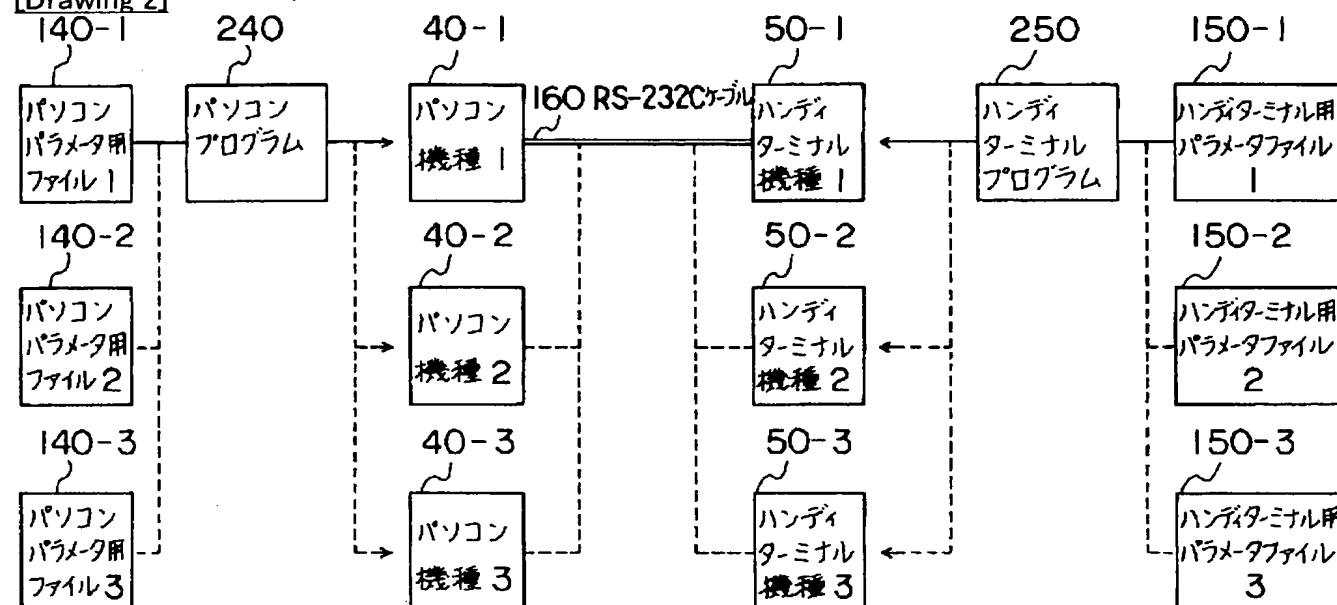
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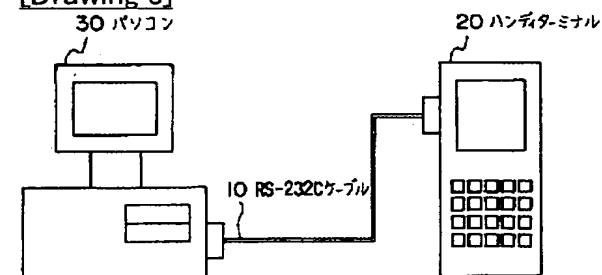
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DRAWINGS

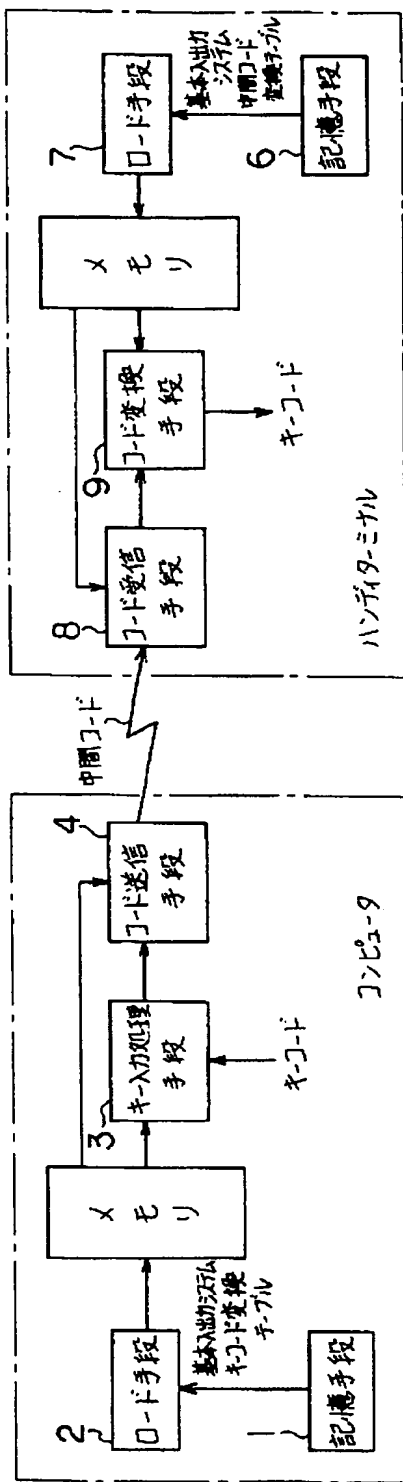
[Drawing 2]



[Drawing 8]

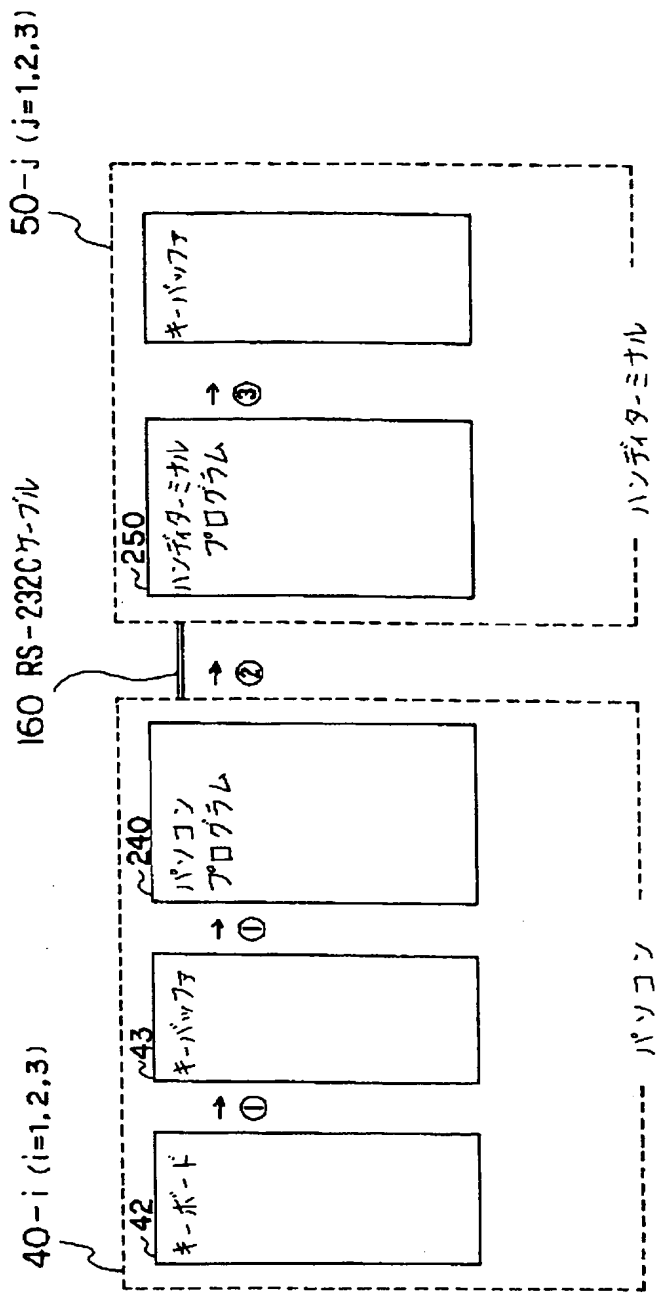


[Drawing 1]



[Drawing 5]

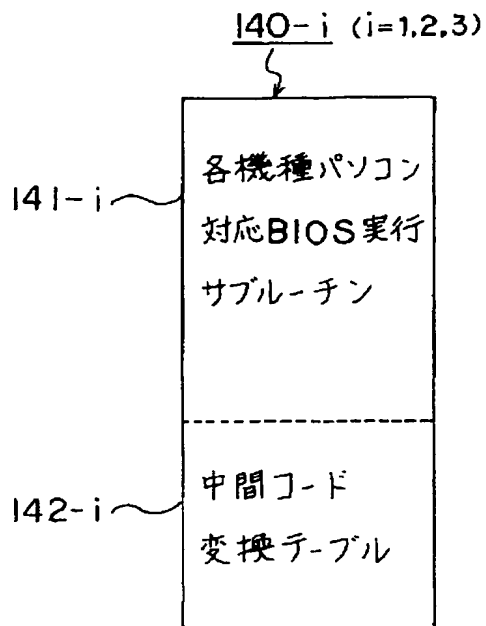
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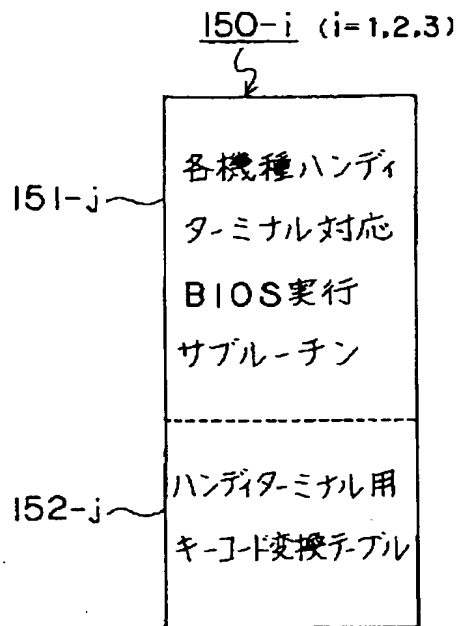
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② 中間コード

③ ハンディターミナル用キーコード

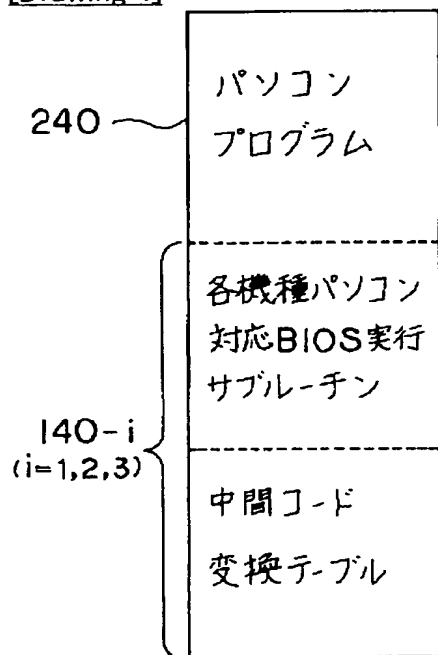


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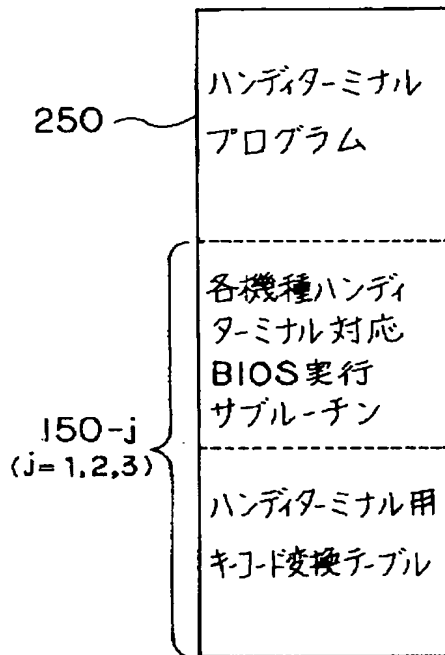


(b)

[Drawing 4]



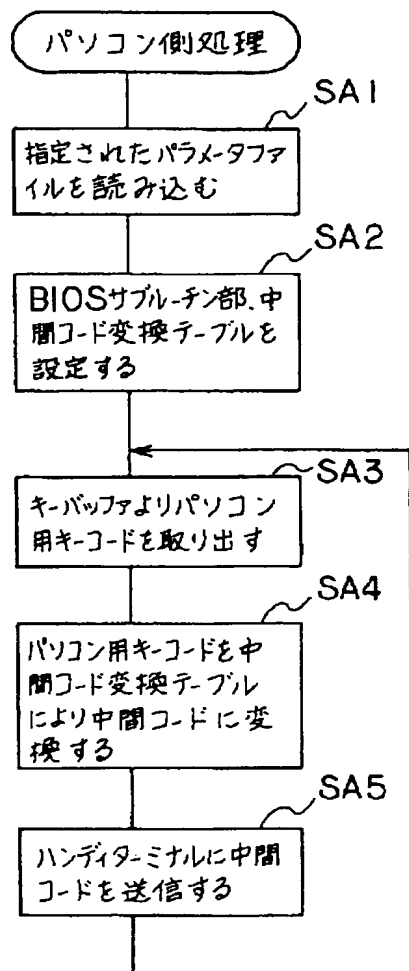
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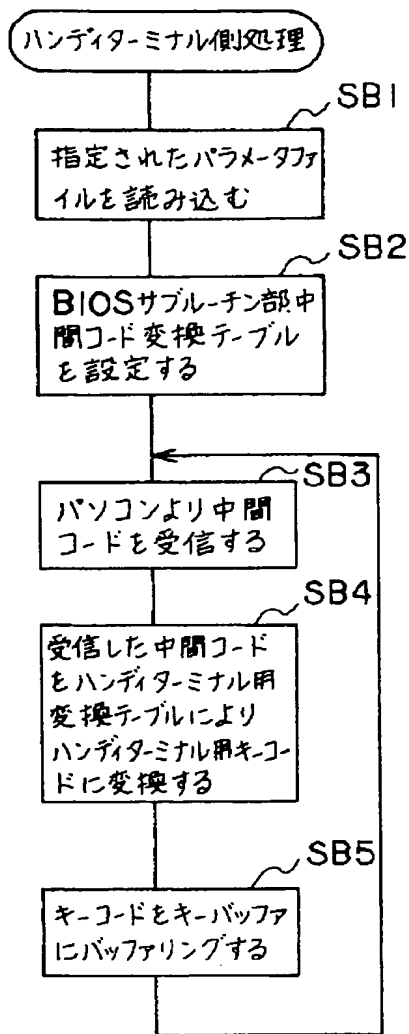
(b)

[Drawing 6]

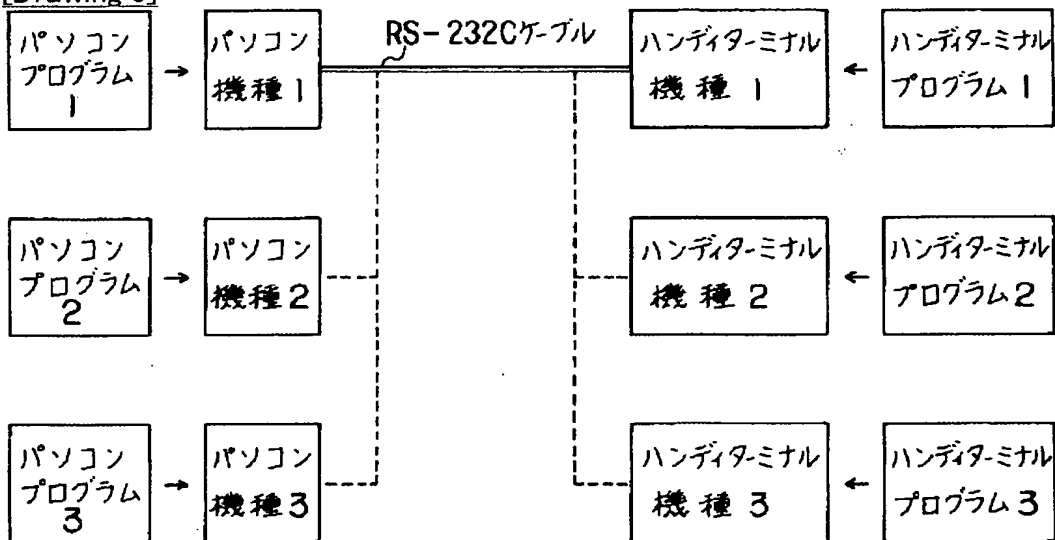




[Drawing 7]



[Drawing 9]



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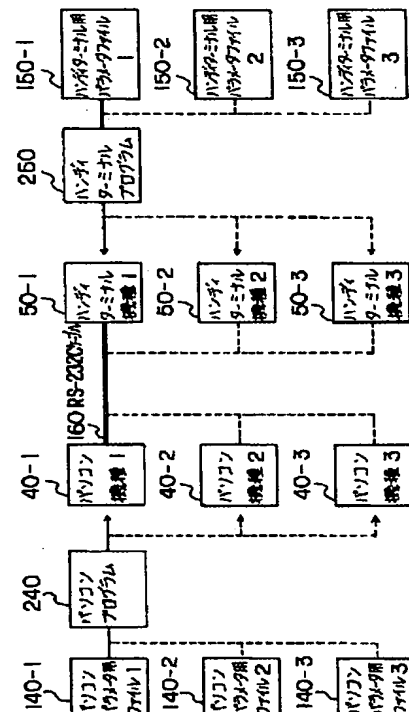
(74)代理人 弁理士 阪本 紀康

(54)【発明の名称】 コンピュータ、ハンディターミナル及びコンピュータからハンディターミナルへのキー入力方式

(57)【要約】

【目的】 多機種のコンピュータから多機種のハンディターミナルへのキー入力をそれぞれ1つの共通プログラムを用いて行えるようにする。

【構成】 パソコンプログラム240の起動により、パソコン40-i (i=1, 2, 3) に対応するパラメータファイル (BIOSファイル、中間コード変換テーブル) 140-i がメモリにロードされる。またハンディターミナルプログラム250の起動により、そのハンディターミナル50-j (j=1, 2, 3) に対応するパラメータファイル (BIOSファイル、キーコード変換テーブル) 150-j がメモリにロードされる。そして、パソコン40-i でキー入力すると、その入力キーに対応するキーコードが中間コードに変換され、ハンディターミナル50-j に送信される。ハンディターミナル50-j は、その中間コードを受信すると、対応するキーコードに変換する。



## 【特許請求の範囲】

【請求項1】 複数の各機種用の基本入出力システム及び前記複数の各機種で使用されるキーコードを共通の中間コードに変換するためのキーコード変換テーブルを、各機種に個別に記憶している記憶手段と、

起動された際に前記記憶手段から自装置で使用する基本入出力システムとキーコード変換テーブルとを読み出し、それらをメモリにロードするロード手段と、

該ロード手段によりメモリにロードされた基本入出力システムに含まれるキーボード基本入出力システムを実行して、キー入力部から入力キーに対応するキーコードを入力し、その入力キーコードを前記ロードされたキーコード変換テーブルを参照して対応する中間コードに変換するキー入力処理手段と、

前記ロードされた基本入出力システムに含まれる通信用基本入出力システムを実行して、前記キー入力処理手段により変換された中間コードを、通信ポートから外部出力するコード送信手段と、

を有することを特徴とするコンピュータ。

【請求項2】 複数の各機種用の基本入出力システム及び所定の各中間コードを前記各機種で使用される対応するキーコードに変換する中間コード変換テーブルを記憶している記憶手段と、

起動された際に、前記記憶手段から自装置で使用する基本入出力システムと中間コード変換テーブルとを読み出し、それらをメモリにロードするロード手段と、

該ロード手段によりメモリにロードされた基本入出力システムに含まれる通信用基本入出力システムを実行して、通信ポートに送信されてくる中間コードを受信するコード受信手段と、

前記基本入出力システムに含まれるキーボード基本入出力システムを実行して、前記コード受信手段により受信された中間コードを、前記中間コード変換テーブルを参照して対応するキーコードに変換するコード変換手段と、

を有することを特徴とするハンディターミナル。

【請求項3】 請求項1記載のコンピュータの通信ポートと請求項2記載のハンディターミナルの通信ポートとを所定の通信ケーブルで接続し、

前記コンピュータ側では、キー入力部から入力された所定のキーコードを前記キー入力処理手段により対応する中間コードに変換した後、その中間コードを前記コード送信手段により前記通信ケーブルを介して前記ハンディターミナルへ送信し、

前記ハンディターミナル側では、その送信されてくる中間コードを前記コード受信手段により受信し、続いてその中間コードを前記コード変換手段により対応するキーコードに変換した後、そのキーコードを入力キーコードとして処理すること、

を特徴とするコンピュータからハンディターミナルへの

キー入力方式。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、パソコン等のコンピュータからハンディターミナルへのキー入力方式に関するものであり、特に多機種のコンピュータから多機種のハンディターミナルへのキー入力を1つの共通プログラムを用いて行えるキー入力方式に関する。

## 【0002】

【従来の技術】今日の経営課題となってきたS I S（戦略情報システム）での末端の情報収集活動を支える端末として、ハンディターミナルの活用的重要性が高まっている。

【0003】このハンディターミナルは、携帯性が重要視されることから、軽量、小型化が計られているため、キー入力部も小さくならざるを得ず、そのため配設されるキーの数も制約される。

【0004】したがって、ハンディターミナルに格納するアプリケーションソフトを開発する場合、図8に示すように、RS-232Cケーブル10によりハンディターミナル20と、パーソナルコンピュータ（以下、パソコンと略称する）30を接続し、キー入力はパソコン30側のキーボードから行うようにして、開発の効率化を図っている。

## 【0005】

【発明が解決しようとする課題】ところで、上記パソコン30側からハンディターミナル20へのキー入力の際には、キーボードBIOS（Basic Input-Output System）及びRS-232C BIOSを実行する必要があるが、これらのBIOSは機種により違うものが使用される。また、キーコード体系も、機種により異なっている。

【0006】このため、従来は図9に示すように、パソコン、ハンディターミナル共、各機種専用のプログラムを起動する必要があった。したがって、多機種のハンディターミナルを開発する場合、各機種専用のプログラムを作成する必要があると共に、キー入力として使用するパソコンにおいても各機種専用のプログラムを作成する必要があり、これらの要因が、ハンディターミナルの開発の遅延化を招く大きな原因となっていた。

【0007】この問題は、基本入出力システムの構成及びキーコード体系が、パソコン、ハンディターミナル共、各機種により異なることに起因している。してみれば、コンピュータ及びハンディターミナル共、プログラム起動開始時に、自装置で使用する基本入出力システムを自動的にメモリにロードできるようにすると共に、さらにコンピュータ側では入力キーに対応するキー入力コードを機種に依存しない共通の中間コードに変換してハンディターミナルに送信し、ハンディターミナル側ではその受信する中間コードを自装置で使用する対応する

キー入力コードに変換して、そのキー入力コードに対応するキー入力処理を行うようにすれば、コンピュータ側及びハンディターミナル側でそれぞれ共通の1つのプログラムを用いて、多機種のコンピュータから多機種のハンディターミナルへのキー入力を行うことができるようになるものと考えられる。

【0008】本発明の課題は、コンピュータ及びハンディターミナル共、プログラム起動開始時に、自装置で使用する基本入出力システムを自動的にメモリにロードできるようにすると共に、コンピュータ側では入力キーに対応するキー入力コードを中間コードに変換してハンディターミナルに送信し、ハンディターミナル側ではその受信する中間コードを自装置で使用する対応するキー入力コードに変換して、そのキー入力コードに対応するキー入力処理を行うことができるようにすることである。

#### 【0009】

【課題を解決するための手段】この発明の手段は次の通りである。まず、請求項1記載の第1の発明の手段は次の通りである。記憶手段1（図1の機能ブロック図参照、以下同じ）は、複数の各機種用の基本入出力システム及び前記複数の各機種で使用されるキーコードを共通の中間コードに変換するためのキーコード変換テーブルを、各機種に個別に記憶している。この記憶手段1は、例えば、ROM（リード・オン・メモリ）、またはフロッピーディスクやハードディスク等の外部記憶装置等から成り、例えば、各機種毎の基本入出力システム（BIOS等）及びキーコード変換テーブルを、個別のファイルとして記憶している。ロード手段2は、起動された際に、記憶手段1から自装置で使用する基本入出力システムとキーコード変換テーブルを読み出し、それらを、主メモリ等のメモリにロードする。キー入力処理手段3は、ロード手段2によりメモリにロードされた基本入出力システムに含まれるキーボード基本入出力システムを実行して、キー入力部から入力キーに対応するキーコードを入力し、その入力キーコードを、ロードされたキーコード変換テーブルを参照して、対応する中間コードに変換する。コード送信手段4は、ロードされた基本入出力システムに含まれる通信用基本入出力システムを実行して、キー入力処理手段3により変換された中間コードを、通信ポートから外部出力する。上記ロード手段2、キー入力手段3、及びコード送信手段4は、一本のプログラムにまとめることができる。次に、請求項2記載の第2の発明の手段は次の通りである。記憶手段6（図1の機能ブロック図参照、以下同じ）は、複数の各機種用の基本入出力システム及び所定の各中間コードを前記各機種で使用される対応するキーコードに変換する中間コード変換テーブルを記憶する。この記憶手段6は、例えば、ICカード（ICメモリカード）等から成り、各機種の基本入出力システム及び中間コード変換テーブル

を、個別のファイルに記憶している。ロード手段7は、起動された際に、記憶手段6から自装置で使用する基本入出力システムと中間コード変換テーブルを読み出し、それらを、例えば、主メモリ等のメモリにロードする。コード受信手段8は、ロード手段7によりメモリにロードされた基本入出力システムに含まれる通信用基本入出力システムを実行して、通信ポートに送信されてくる中間コードを受信する。コード変換手段9は、前記基本入出力システムに含まれるキーボード基本入出力システムを実行して、コード受信手段8により受信された中間コードを、前記中間コード変換テーブルを参照して対応するコードに変換し、例えばキーデータバッファ（キーバッファ）等に格納する。上記ロード手段7、コード受信手段8、及びコード変換手段9は、一本のプログラムにまとめることが可能である。また、請求項3記載の第3の発明の手段は、次の通りである。図1の機能ブロック図に示すように、上記第1の発明のコンピュータの通信ポート（例えば、RS-232Cポート）と上記第2の発明のハンディターミナルの通信ポート（例えば、RS-232Cポート）とを所定の通信ケーブル（例えば、RS-232Cケーブル）で接続し、前記コンピュータ側では、キー入力部から入力された所定のキーコードをキー入力処理手段3により対応する中間コードに変換した後、その中間コードをコード送信手段4により前記通信ケーブルを介して前記ハンディターミナルへ送信し、前記ハンディターミナル側では、その送信されてくる中間コードを、コード受信手段8により受信し、続いて、その中間コードをコード変換手段9により対応するキーコードに変換した後、そのキーコードを入力キーコードとして処理する。

#### 【0010】

【作用】第1の発明の手段の作用は次の通りである。まず、初期設定処理において、ロード手段2が起動され、ロード手段2は、記憶手段1から、自装置で実行可能な基本入出力システム及び自装置で使用するキーコードを所定の中間コードに変換するためのキーコード変換テーブルを選択し、メモリにロードする。そして、以後、キー入力部からキー入力が行われる毎に、キー入力処理手段3は、上記メモリ・ロードされた基本入出力システムの中のキーボード基本入出力システムをファンクション・コール（ファンクション・リクエスト）により実行し、上記入力キーに対応するキーコードを読み出し、続いて、そのキーコードを、上記メモリ・ロードされたキーコード変換テーブルを参照して対応する中間コードに変換する。次に、コード送信手段4が起動され、コード送信手段4は、上記基本入出力システムの中の通信用基本入出力システムを、ファンクション・コール（ファンクション・リクエスト）により実行し、上記中間コードを通信ポートから外部出力する。このように、初期設定処理において、各コンピュータのメモリには、自装置で

実行可能な基本入出力システムがメモリにロードされる。このため、各コンピュータが上記処理を行う際に実行するプログラム内における上記キーボード基本入出力システムのファンクションコールのステートメントを、全てのコンピュータにおいて、同一のステートメントで記述することが可能である。したがって、多機種のコンピュータが、1つの共通プログラムを実行して、キー入力毎に、その入力キーに対応する機種に依存しない共通の中間コードを多機種のハンディターミナルへ送信することができる。第2の発明の手段の作用は次の通りである。まず、初期設定処理において、ロード手段7が起動され、ロード手段7は、記憶手段6から、自装置で実行可能な基本入出力システムと中間コードを自装置で使用するキーコードに変換する中間コード変換テーブルとを選択し、メモリにロードする。そして、以後、通信ポートに中間コードが送信される毎に、コード受信手段8は、上記メモリ・ロードされた基本入出力システムの中の通信用基本入出力システムをファンクション・コール（ファンクション・リクエスト）により実行し、その中間コードを受信する。続いて、コード変換手段9は、上記基本入出力システムの中のキーボード基本入出力システムをファンクション・コール（ファンクション・リクエスト）により実行し、上記受信された中間コードを、上記メモリ・ロードされた中間コード変換テーブルを参照して、自装置で使用する対応するキーコードに変換し、例えば所定のキーデータ・バッファ（キーバッファ）等のメモリの一領域に格納する。そして、このキーデータ・バッファに格納されたキーコードは、所定のキー入力処理手段により、入力キーに対応するキーコードとして読み出される。このように、初期設定処理において、各コンピュータのメモリには、自装置で実行可能な基本入出力システムがメモリにロードされる。このため、各ハンディターミナルが上記処理を行う際に実行するプログラム内における通信用基本入出力システム及び上記キーボード基本入出力システムのファンクションコールのステートメントを、全てのハンディターミナルにおいて同一のステートメントで記述することが可能である。したがって、多機種のハンディターミナルが、1つの共通プログラムを実行して、多機種のコンピュータからキー入力毎に送信されてくる共通の中間コードを受信し、次にその中間コードを自装置で使用するキー入力コードに変換して、所定のキー入力処理を行うことができる。第3の発明の手段の作用は次の通りである。まず、コンピュータの通信ポート（例えば、RS-232Cポート等）とハンディターミナルの通信ポート（例えば、RS-232Cポート等）とを、所定の通信ケーブル（例えば、RS-232Cケーブル等）で接続する。次に、コンピュータ側及びハンディターミナル側で、所定のプログラムを起動して、初期設定処理を行う。この初期設定処理により、上述のようにして、コンピュータ

のメモリ（例えば、主メモリ）には、ロード手段2により、記憶手段6から読み出された実行可能な基本入出力システム及び内部で使用するキーコードを機種に依存しない共通の中間コードに変換するためのキーコード変換テーブルがロードされる。一方、ハンディターミナルのメモリ（例えば、主メモリ）には、ロード手段7により、記憶手段6から読み出された実行可能な基本入出力システム及び上記コンピュータから受信する中間コードを内部で使用するキーコードに変換するための中間コード変換テーブルが、ロードされる。そして、以後、コンピュータは、キーボードからキー入力が行われると、キー入力処理手段3によりその入力キーに対応するキーコードを対応する中間コードに変換し、続いて、コード送信手段4によりその中間コードを上記通信ケーブルを介しハンディターミナルの通信ポートに送信する。ハンディターミナルは、上記通信ポートに送信されてくる中間コードをコード受信手段8により受信し、続いて、コード変換手段9により、その中間コードを自装置で使用する対応するキーコードに変換する。そして、そのキーコードを、自装置でのキー入力により入力されたキーコードとみなして、所定のキー入力処理を行う。したがって、コンピュータ及びハンディターミナル共、プログラム起動開始時に、自装置で使用する基本入出力システムを自動的にメモリにロードできると共に、コンピュータ側では入力キーに対応するキー入力コードを中間コードに変換してハンディターミナルハンディターミナルに送信し、ハンディターミナル側ではその受信する中間コードを自装置で使用する対応するキー入力コードに変換して、そのキー入力コードに対応するキー入力処理を行うことができる。

【0011】

【実施例】以下、図2乃至図7を参照して一実施例を説明する。図2は、パソコンからハンディターミナルへのキー入力方式を説明する図である。

【0012】同図において、パソコン40-1、40-2、40-3はいずれも異なる機種であり、実行可能なBIOS及びキーコード体系が異なっている。また、ハンディターミナル50-1、50-2、50-3も互いに異なった機種であり、実行可能BIOS及びキーコード体系が異なっている。

【0013】上記パソコン40-1、40-2、40-3には、図3(a)に示すような各パソコン40-i（i=1, 2, 3）が実行可能BIOSサブルーチン141-iと各パソコン40-i（i=1, 2, 3）で使用されるコードを所定の共通する中間コードに変換するための中間コード変換テーブル142-iとから成るパソコン用・パラメータファイル140-i（i=1, 2, 3）が用意されており、これらのパソコン用パラメータファイル140-1、140-2、140-3は、磁気ディスク等の外部記憶装置に格納されている。

【0014】また、上記ハンディターミナル50-j (j=1, 2, 3) にも、図3(b) に示すような各ハンディターミナル50-j (j=1, 2, 3) が実行可能なBIOSサブルーチン151-j (j=1, 2, 3) と上記中間コードを各ハンディターミナル50-j (j=1, 2, 3) で使用されるコードに変換するためのキーコード変換テーブル152-j (j=1, 2, 3, ) とから成るハンディターミナル用・パラメータファイル150-j (j=1, 2, 3) が用意されており、これらのハンディターミナル用・パラメータファイル150-1, 150-2, 150-3は、ICカード(ICメモリカード)等の外部記憶装置に格納されている。

【0015】また、パソコンプログラム240は、上記各パソコン40-i (i=1, 2, 3) のキーボードから上記各ハンディターミナル50-i (i=1, 2, 3) へのキー入力を行う際に実行されるプログラムであり、全てのパソコン40-1, 40-2, 40-3で共通に実行可能である。

【0016】一方、ハンディターミナルプログラム250は、各パソコン40-i (i=1, 2, 3) がRS-232Cケーブル160を介して送信してくる各パソコン40-1, 40-2, 40-3のキーボードのキー入力により入力されたキーコードに対応する中間コードを、RS-232Cポートを介して受信する際に実行されるプログラムであり、全てのハンディターミナル50-1, 50-2, 50-3で共通に実行可能である。

【0017】次に、上記構成のシステムにおけるパソコン40-i (i=1, 2, 3) からハンディターミナル50-j (j=1, 2, 3) へのキー入力動作を図4、図5、及び図6並びに図7のフローチャートを参照しながら説明する。

【0018】まず、パソコン40-i (i=1, 2, 3) 及びハンディターミナル50-j (j=1, 2, 3) で、それぞれプログラム240、250を起動する。この起動により、パソコン40-i (i=1, 2, 3) は、外部記憶装置から対応するパソコン用パラメータファイル140-i (i=1, 2, 3) を読み出し、それを主メモリ上に図4(a) に示すレイアウト(メモリマップ)でロードする(図6のフローチャートのSA1, SA2)。一方、ハンディターミナル50-j (j=1, 2, 3) は、ICカード等から対応するハンディターミナル用パラメータファイル150-j (j=1, 2, 3) を読み出し、それを主メモリ上に図4(b) に示すレイアウト(メモリマップ)でロードする(図7のフローチャートのSB1, SB2)。

【0019】続いて、パソコン40-i (i=1, 2, 3) のキーボード42からハンディターミナル50-j (j=1, 2, 3) へのキー入力を行った際のキー入力データの流れを、図5を参照しながら説明する。

【0020】パソコン40-i (i=1, 2, 3) のキ

ーボード42の任意のキーを入力操作すると、パソコン40-i (i=1, 2, 3) は、パソコンプログラム240に記述されているファンクション・コールにより主メモリ上にロードされているキーボードBIOSを実行し、主メモリ上に設けられたキーバッファ43に、その入力キーに対応するパソコン40-i用のキーコードを格納する。続いて、パソコン40-i (i=1, 2, 3) は、パソコンプログラム240を実行して、そのキーバッファ43から上記キーコードを取り出し(SA3)、中間コード変換テーブル140-i (i=1, 2, 3) を参照して、上記キーコードを中間コードに変換する(SA4)。

【0021】次に、パソコン40-i (i=1, 2, 3) は、パソコンプログラム240に記述されているファンクション・コールにより主メモリ上にロードされているRS-232C BIOSを実行し、上記中間コードを、RS-232CポートからRS-232Cケーブル160を介し、ハンディターミナル50-j (j=1, 2, 3) へ送信する(SA5)。

【0022】上記処理SA3~SA5は、パソコン40-i (i=1, 2, 3) のキーボード42でキー入力操作が行われるたび、パソコン40-i (i=1, 2, 3) により実行され、その入力キーに対応する中間コードが、RS-232Cケーブル160を介しハンディターミナル50-j (j=1, 2, 3) のRS-232Cポートへ送信される。

【0023】上記動作により、パソコン40-i (i=1, 2, 3) のキーボード42でキー入力を行うとパソコン40-i (i=1, 2, 3) からその入力キーに対応する中間コードがハンディターミナル50-j (j=1, 2, 3) へ送信される。したがって、パソコン40-i (i=1, 2, 3) のキーボード42を操作して、各ハンディターミナル50-j (j=1, 2, 3) へ各種コマンドやデータを送信することが可能となる。

【0024】続いて、上述のようにしてパソコン40-i (i=1, 2, 3) からRS-232Cケーブル160を介して送信されてくるパソコン40-i (i=1, 2, 3) のキーボード42で入力操作されたキーに対応する中間コードを処理するハンディターミナル50-j (j=1, 2, 3) の動作を、図5及び図7のフローチャートを参照しながら説明する。

【0025】ハンディターミナル50-j (j=1, 2, 3) は、ハンディターミナルプログラム250に記述されているファンクション・コールにより主メモリにロードされているRS-232C BIOSを実行し、RS-232Cポートからパソコン40-i (i=1, 2, 3) の送信した中間コードを受信し(SB4)、その中間コードを主メモリ上に設けられた受信バッファに格納する(SB3)。

【0026】次に、ハンディターミナル50-j (j=

1, 2, 3) は、ハンディターミナルプログラム250に記述されているファンクション・コールにより、主メモリ上にロードされているキーボードBIOSを実行し、上記受信バッファに格納されている中間コードを、ハンディターミナル用キーコード変換テーブル152-j (j=1, 2, 3) を参照してハンディターミナル50-j (j=1, 2, 3) 用のキーコードに変換し (SB4)、そのキーコードを主メモリ上に設けられたキーバッファ53に格納する (SB5)。

【0027】ハンディターミナル50-j (j=1, 2, 3) は、上記処理SB3~SB5を、パソコン40側から中間コードが送信されてくるたびに、それらの中間コードに対応するハンディターミナル50-j (j=1, 2, 3) 用のキーコードをキーバッファ53に順次格納する。そして、ハンディターミナル50-j (j=1, 2, 3) は、このキーバッファ53に格納されたキーコードを自装置の入力キーに対応するキーコードとみなし、所定のキー入力処理を行う。

【0028】上述した、一連の動作によりハンディターミナル50-j (j=1, 2, 3) のキー入力部を使用しなくても、コンピュータ40-i (i=1, 2, 3) のキーボード42を操作して、ハンディターミナル50-j (j=1, 2, 3) に各種データや各種コマンドキー入力することが可能となる。このため、例えば、パソコン40-i (i=1, 2, 3) のキーボード42からキー入力を行って、ハンディターミナル50-j (j=1, 2, 3) に実装されるアプリケーションソフトのデバッグ等を容易なキー操作により、詳細に行うことが可能になる。

【0029】このように、機種の異なる各パソコン40-1, 40-2, 40-3及び機種の異なる各ハンディターミナル50-1, 50-2, 50-3が実行するパソコンプログラム240及びハンディターミナル250の起動時において、各パソコン40-1, 40-2, 40-3及び各ハンディターミナル50-1, 50-2, 50-3には、それらの装置で実行可能なBIOSが主メモリにロードされる。したがって各パソコン40-1, 40-2, 40-3及び各ハンディターミナル50-1, 50-2, 50-3が、それぞれ実行するパソコンプログラム240及びハンディターミナルプログラム250に記述する、キー入力及びRS-232Cデータ転送のBIOSファンクション・コール (BIOSサブルーチンコール) のステートメントを、共通化することができる。また、パソコンプログラム240、ハンディターミナル250の起動時においては、機種の異なる各パソコン40-i (i=1, 2, 3) が独自に使用しているキーコードを共通の中間コードに変換するための中間コード変換テーブル142-iも主メモリにロードされるので、パソコンプログラム240に記述されるキーコードから中間コードへの変換を行うルーチンのステ

トメントも共通化できる。

【0030】したがって、機種の異なる各パソコン40-1, 40-2, 40-3は、全て同一のパソコンプログラム240を実行することにより、機種の異なる各ハンディターミナル50-1, 50-2, 50-3に対し、自装置のキーボードでキー入力操作が行われる毎に、その入力キーに対応する中間コードを、ハンディターミナル50-j (j=1, 2, 3) に送信することができる。

【0031】一方、機種の異なる各ハンディターミナル50-j (j=1, 2, ) においても、ハンディターミナルプログラム250の起動時に、自装置が実行可能なBIOSと共に上記共通の中間コードを各ハンディターミナル50-jが独自に使用しているキーコードに変換するためのハンディターミナル用コード変換テーブル152-j (j=1, 2, 3) が主メモリにロードされるので、ハンディターミナルプログラム250に記述するRS-232Cポートからのデータ入力、並びにキー入力のBIOSファンクション・コール (BIOSサブルーチンコール) の各ステートメント、及び上記中間コードを各ハンディターミナル50-1, , 50-2, 50-3が独自に使用しているキーコードに変換するためのルーチンのステートメントを共通化できる。

【0032】したがって、機種の異なる各ハンディターミナル50-1, 50-2, 50-3は、同一のハンディターミナルプログラム250を実行することにより、RS-232Cケーブル160で接続されている任意の機種のパソコン40-i (i=1, 2, 3) からそのパソコン40-i (i=1, 2, 3) のキーボード42で入力操作されたキーに対応する中間コードを受信し、次にその中間コードを自装置で使用可能なキーコードに変換して、そのキーコードに対応するキー入力処理を行うことが可能となる。

【0033】また、図4に示すように、パソコンプログラム240及びハンディターミナルプログラム250は、それぞれ各機種のパソコン40-i (i=1, 2, 3) 及び各機種のハンディターミナル50-j (j=1, 2, 3) に共通対応とし、パラメータファイル140-i, 150-j (BIOSファンクション実行ルーチン、キーコード変換テーブル) のみを各機種毎に個別対応とした。したがって、新たな機種のパソコンまたはハンディターミナルを使用する場合、パラメータファイルのみを新たに作成するだけでよいので、例えば、新たな機種のハンディターミナルに実装されるプログラムのデバッグにも迅速に対処でき、そのプログラムの開発効率が向上する。

【0034】

【発明の効果】この発明は、コンピュータ及びハンディターミナル共、プログラム起動開始時に、自装置で使用する基本入出力システムを自動的にメモリにロードでき



るようにすると共に、コンピュータ側では入力キーに対応するキー入力コードを中間コードに変換してハンディターミナルに送信し、ハンディターミナル側ではその受信する中間コードを自装置で使用される対応するキー入力コードに変換して、そのキー入力コードに対応するキー入力処理を行うようにしたので、コンピュータ側及びハンディターミナル側でそれぞれ共通の1つのプログラムを用いて、多機種のコンピュータから多機種のハンディターミナルへのキー入力を行うことができる。

【図面の簡単な説明】

【図1】本発明の機能ブロック図である。

【図2】一実施例のパソコンからハンディターミナルへのキー入力方式を説明する図である。

【図3】各機種のパソコン並びにハンディターミナルで使用されるパラメータファイルの構成を示す図である。

【図4】当該プログラムが起動されたときのパソコン及びハンディターミナルの主メモリのメモリマップを示す

図である。

【図5】本実施例の動作の概要を説明する図である。

【図6】パソコン側で行われる処理を説明するフローチャートである。

【図7】ハンディターミナル側で行われる処理を説明するフローチャートである。

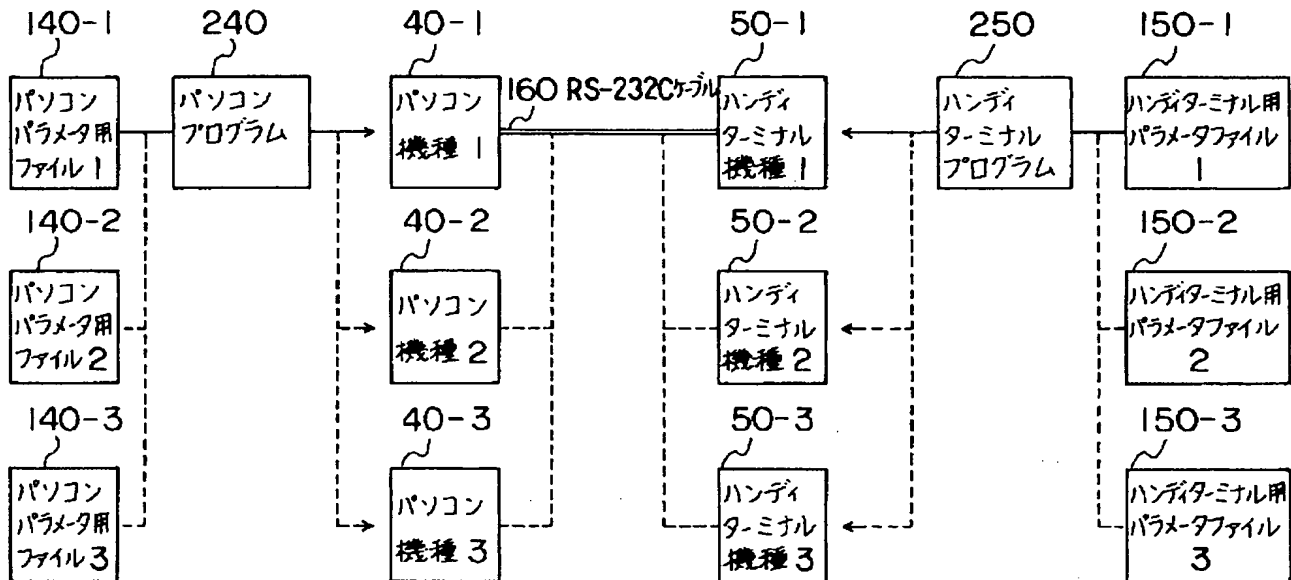
【図8】パソコンからハンディターミナルへキー入力を行うときのシステム構成を示す図である。

10 【図9】従来の多機種のパソコンから多機種のハンディターミナルへのキー入力方式を説明する図である。

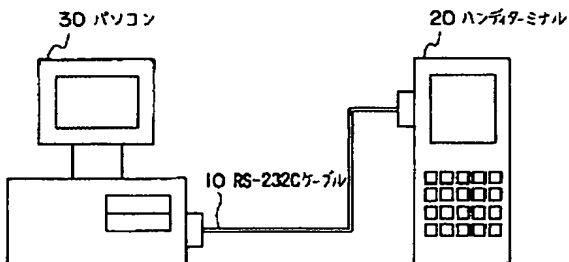
【符号の説明】

- |      |          |
|------|----------|
| 1, 6 | 記憶手段     |
| 2, 7 | ロード手段    |
| 3    | キー入力処理手段 |
| 4    | コード送信手段  |
| 8    | コード受信手段  |
| 9    | コード変換手段  |

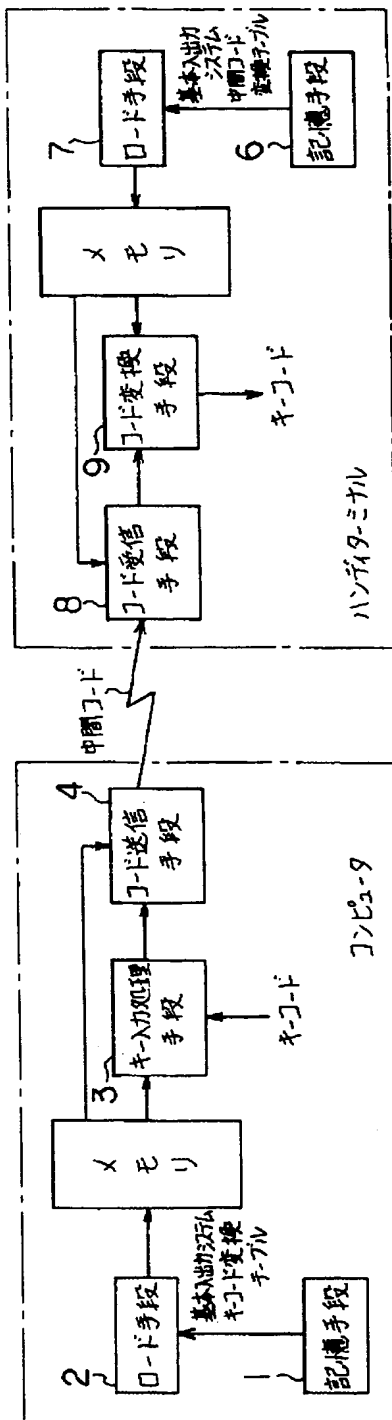
【図2】



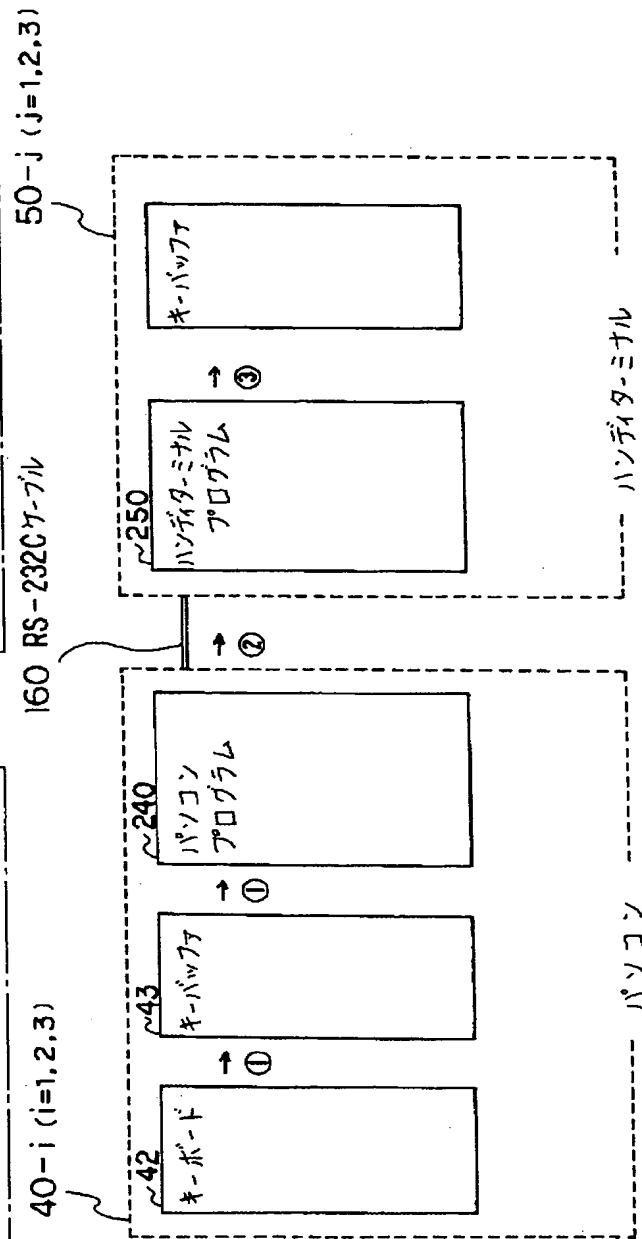
【図8】



【図1】



【図5】

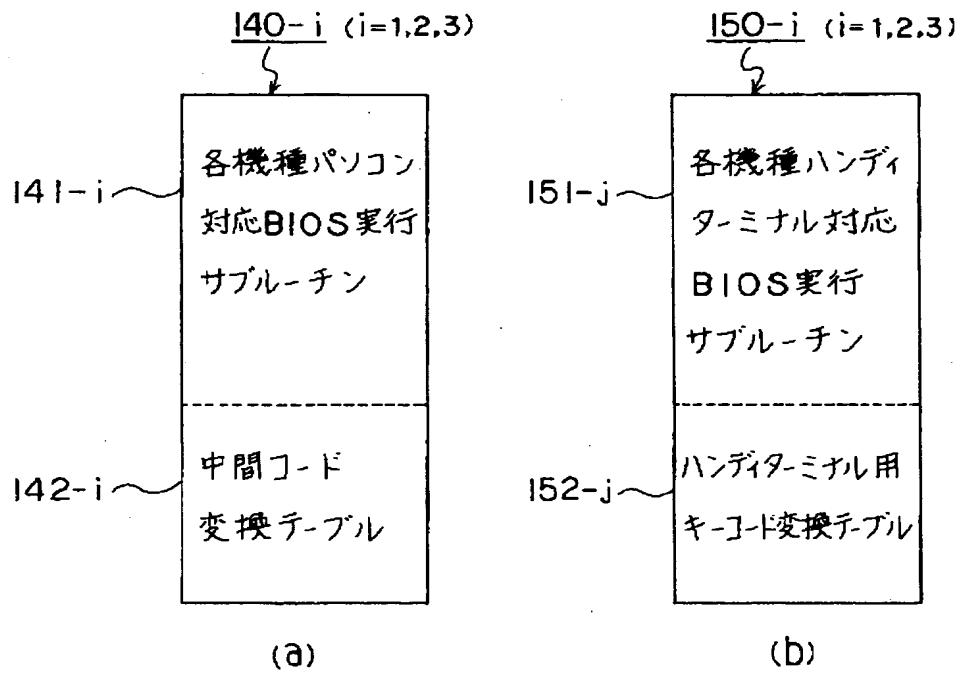


① パソコン用キーコード

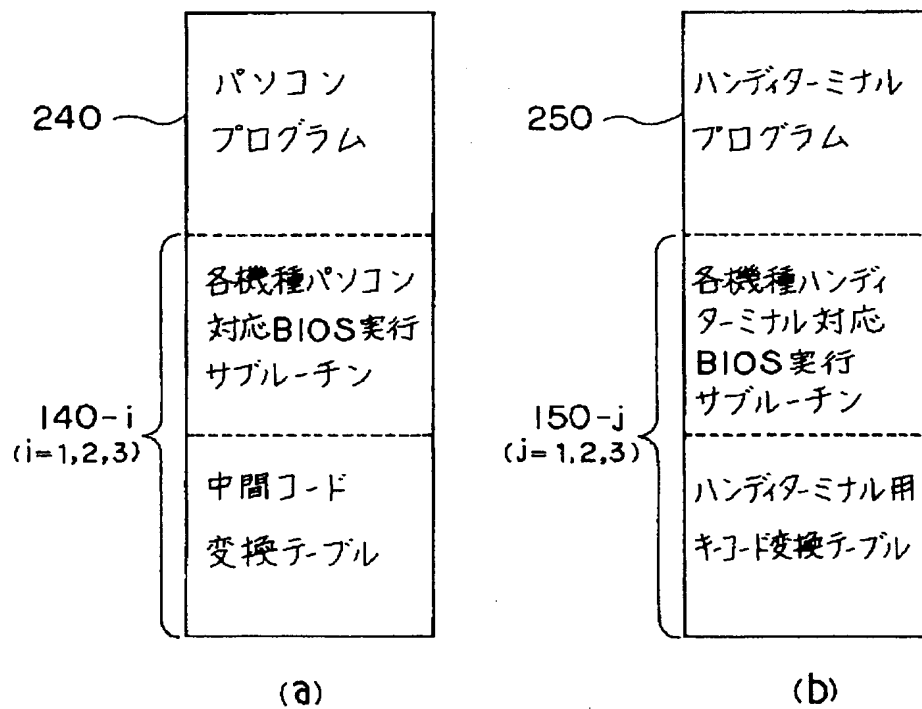
② 中間コード

③ ハンディターミナル用キーコード

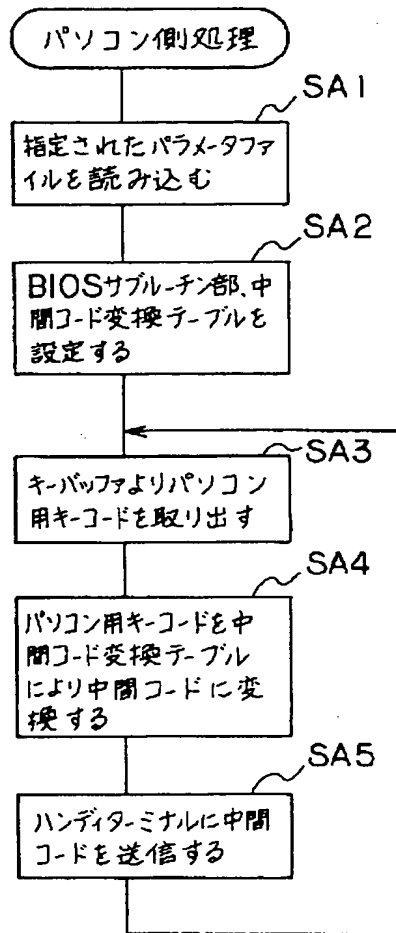
【図3】



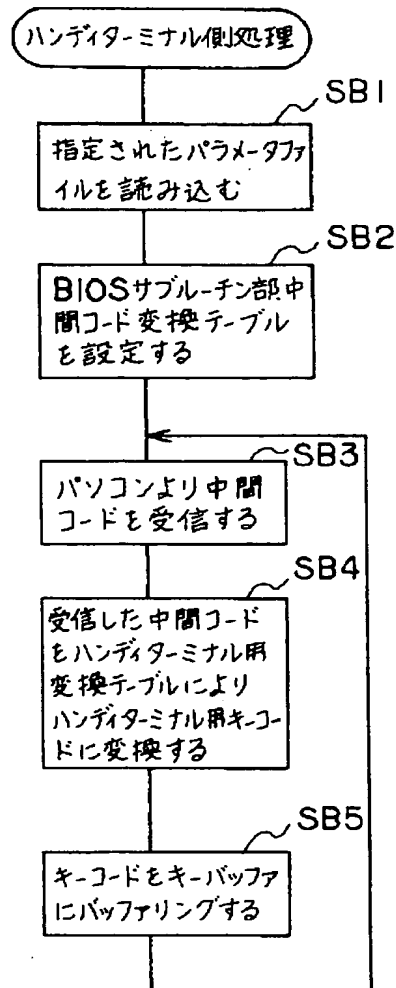
【図4】



【図6】



【図7】



【図9】

